

## CLAIMS

1. An organic light-emitting device comprising an organic layer of a one or more-layered structure  
5 comprising at least one compound having a phosphorescence lifetime of 880 ms or more at 77K.

2. The organic light-emitting device according to claim 1, wherein the organic layer comprises at least one compound having a phosphorescence lifetime  
10 of 1100 ms or more.

3. The organic light-emitting device according to claim 1 or 2, wherein the compound is contained in a light-emitting layer.

4. The organic light-emitting device according  
15 to claim 3, wherein the light-emitting layer comprises at least one host material and at least one light-emitting material.

5. The organic light-emitting device according to claim 3 or 4, wherein the compound is a host  
20 material.

6. The organic light-emitting device according to claim 4 or 5, wherein the fluorescence lifetime at 77K of the host material of the light-emitting layer is  $5.8 \times 10^5$  or more times the fluorescence lifetime  
25 of the light-emitting material of the light-emitting layer.

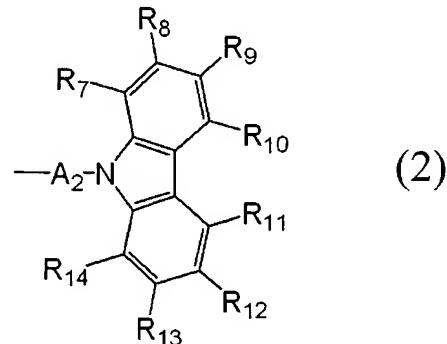
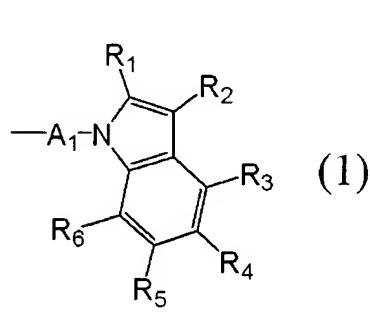
7. The organic light-emitting device according

to any one of claims 4 to 6, wherein the light-emitting material is a metal coordination compound.

8. The organic light-emitting device according to claim 7, wherein the metal coordination compound 5 is an iridium coordination compound.

9. The organic light-emitting device according to any one of claims 1 to 6, wherein the compound has, in a molecule, at least one partial structure comprising an unsubstituted or substituted indole 10 ring and at least one partial structure comprising an unsubstituted or substituted carbazole ring.

10. The organic light-emitting device according to claim 9, wherein the partial structure comprising the unsubstituted or substituted indole ring is 15 represented by the following general formula (1), and the partial structure comprising the unsubstituted or substituted carbazole ring is represented by the following general formula (2):



20 wherein  $A_1$  and  $A_2$  independently represents a single bond, an unsubstituted or substituted arylene group,

or an unsubstituted or substituted divalent heterocyclic group; and  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$ ,  $R_8$ ,  $R_9$ ,  $R_{10}$ ,  $R_{11}$ ,  $R_{12}$ ,  $R_{13}$ , and  $R_{14}$  are independently selected from an hydrogen atom, a halogen atom, a

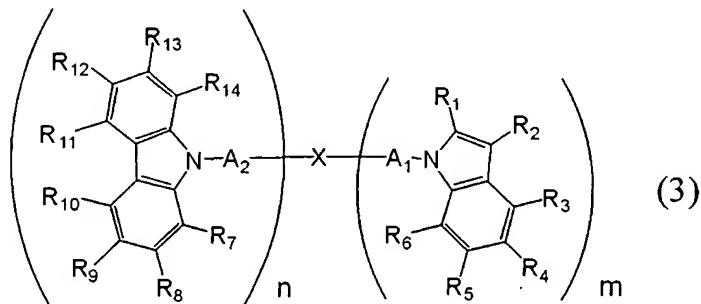
5 linear or branched alkyl group having 1-20 carbon atoms (wherein one methylene group or two or more non-adjacent methylene groups of the alkyl group may be replaced by  $-O-$ ,  $-S-$ ,  $-CO-$ ,  $-CO-O-$ ,  $-O-CO-$ ,  $-CH=CH-$ , or  $-C\equiv C-$ , or one or more methylene groups

10 may be replaced by an unsubstituted or substituted arylene group or an unsubstituted or substituted divalent heterocyclic group, and a hydrogen atom in the alkyl group may be replaced by a fluorine atom), an unsubstituted or substituted aryl group, and an

15 unsubstituted or substituted heterocyclic group, and adjacent ones of  $R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$ ,  $R_8$ ,  $R_9$ ,  $R_{10}$ ,  $R_{11}$ ,  $R_{12}$ ,  $R_{13}$ , and  $R_{14}$  may be bonded together to form a ring.

11. The organic light-emitting device according to claim 10, wherein the compound is represented by

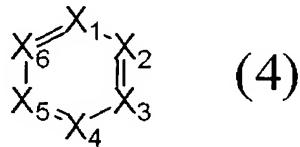
20 the following general formula (3):



wherein  $m$  and  $n$  are independently an integer of 1-5,

and the sum of m and n is an integer of 2-6, and X is an unsubstituted or substituted, m+n valent organic group.

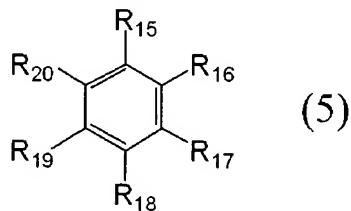
12. The organic light-emitting device according  
5 to claim 11, wherein the compound is represented by  
the following general formula (4):



wherein X<sub>1</sub> represents a nitrogen atom or C-R<sub>15</sub>, X<sub>2</sub> represents a nitrogen atom or C-R<sub>16</sub>, X<sub>3</sub> represents a 10 nitrogen atom or C-R<sub>17</sub>, X<sub>4</sub> represents a nitrogen atom or C-R<sub>18</sub>, X<sub>5</sub> represents a nitrogen atom or C-R<sub>19</sub>, X<sub>6</sub> represents a nitrogen atom or C-R<sub>20</sub>, and the number of nitrogen atoms in X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub>, X<sub>5</sub>, and X<sub>6</sub> is 4 or less; R<sub>15</sub>, R<sub>16</sub>, R<sub>17</sub>, R<sub>18</sub>, R<sub>19</sub>, and R<sub>20</sub> is independently 15 selected from an hydrogen atom, a halogen atom, a linear or branched alkyl group having 1-20 carbon atoms (wherein one methylene group or two or more non-adjacent methylene groups of the alkyl group may be replaced by -O-, -S-, -CO-, -CO-O-, -O-CO-, -CH=CH-, or -C≡C-, or one or more methylene groups may be replaced by an unsubstituted or substituted arylene group or an unsubstituted or substituted divalent heterocyclic group, and a hydrogen atom in the alkyl group may be replaced by a fluorine atom), 20 an unsubstituted or substituted aryl group, and an 25

unsubstituted or substituted heterocyclic group, with the proviso that at least one of  $R_{15}$ ,  $R_{16}$ ,  $R_{17}$ ,  $R_{18}$ ,  $R_{19}$ , and  $R_{20}$  is a partial structure comprising an indole ring represented by the general formula (1) and at least another of  $R_{15}$ ,  $R_{16}$ ,  $R_{17}$ ,  $R_{18}$ ,  $R_{19}$ , and  $R_{20}$  is a partial structure comprising a carbazole ring represented by the general formula (2).

13. The organic light-emitting device according to claim 12, wherein the compound is represented by 10 the following general formula (5):



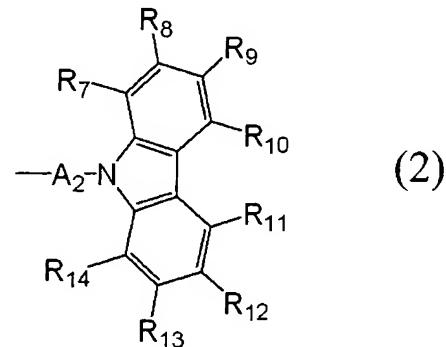
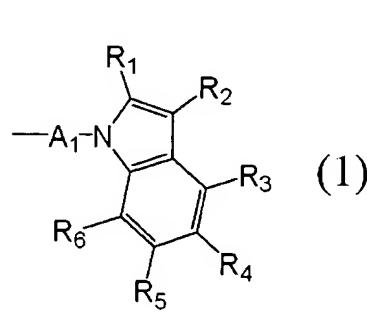
which corresponds to the general formula (4) in which  $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$ ,  $X_5$ , and  $X_6$  are all not nitrogen.

14. The organic light-emitting device according 15 to claim 12 or 13, wherein at least three of  $R_{15}$ ,  $R_{16}$ ,  $R_{17}$ ,  $R_{18}$ ,  $R_{19}$ , and  $R_{20}$  are independently a partial structure represented by the general formula (1) or (2).

15. An organic compound having, in a molecule, 20 at least one partial structure comprising an unsubstituted or substituted indole ring and at least one partial structure comprising an unsubstituted or substituted carbazole ring.

16. The organic compound according to claim 15,

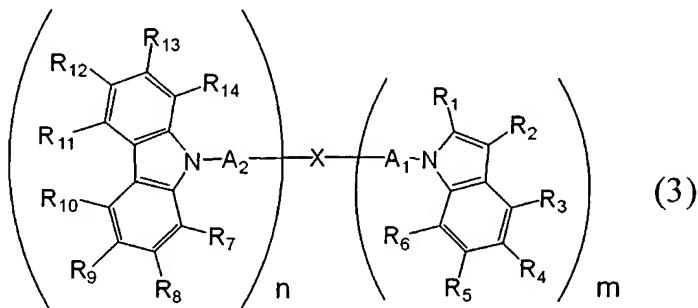
wherein the partial structure comprising the unsubstituted or substituted indole ring is represented by the following general formula (1), and the partial structure comprising the unsubstituted or 5 substituted carbazole ring is represented by the following general formula (2):



wherein  $A_1$  and  $A_2$  independently represents a single bond, an unsubstituted or substituted arylene group, 10 or an unsubstituted or substituted divalent heterocyclic group; and  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$ ,  $R_8$ ,  $R_9$ ,  $R_{10}$ ,  $R_{11}$ ,  $R_{12}$ ,  $R_{13}$ , and  $R_{14}$  are independently selected from an hydrogen atom, a halogen atom, a linear or branched alkyl group having 1-20 carbon 15 atoms (wherein one methylene group or two or more non-adjacent methylene groups of the alkyl group may be replaced by  $-O-$ ,  $-S-$ ,  $-CO-$ ,  $-CO-O-$ ,  $-O-CO-$ ,  $-CH=CH-$ , or  $-C\equiv C-$ , or one or more methylene groups may be replaced by an unsubstituted or substituted 20 arylene group or an unsubstituted or substituted divalent heterocyclic group, and a hydrogen atom in

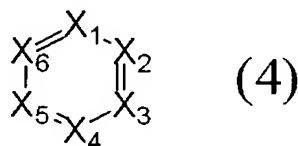
the alkyl group may be replaced by a fluorine atom), an unsubstituted or substituted aryl group, and an unsubstituted or substituted heterocyclic group, and adjacent ones of  $R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$ ,  $R_8$ ,  $R_9$ ,  $R_{10}$ ,  $R_{11}$ ,  $R_{12}$ ,  
5  $R_{13}$ , and  $R_{14}$  may be bonded together to form a ring.

17. The organic compound according to claim 16, which is represented by the following general formula (3) :



10 wherein  $m$  and  $n$  are independently an integer of 1-5, and the sum of  $m$  and  $n$  is an integer of 2-6, and  $X$  is an unsubstituted or substituted,  $m+n$  valent organic group.

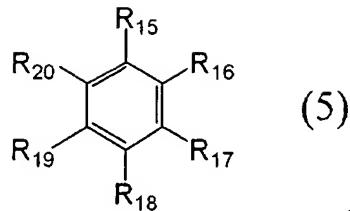
15 18. The organic compound according to claim 17, which is represented by the following general formula (4) :



wherein  $X_1$  represents a nitrogen atom or  $C-R_{15}$ ,  $X_2$  represents a nitrogen atom or  $C-R_{16}$ ,  $X_3$  represents a 20 nitrogen atom or  $C-R_{17}$ ,  $X_4$  represents a nitrogen atom

or C-R<sub>18</sub>, X<sub>5</sub> represents a nitrogen atom or C-R<sub>19</sub>, X<sub>6</sub> represents a nitrogen atom or C-R<sub>20</sub>; R<sub>15</sub>, R<sub>16</sub>, R<sub>17</sub>, R<sub>18</sub>, R<sub>19</sub>, and R<sub>20</sub> is independently selected from an hydrogen atom, a halogen atom, a linear or branched 5 alkyl group having 1-20 carbon atoms (wherein one methylene group or two or more non-adjacent methylene groups of the alkyl group may be replaced by -O-, -S-, -CO-, -CO-O-, -O-CO-, -CH=CH-, or -C≡C-, or one or more methylene groups may be replaced by an 10 unsubstituted or substituted arylene group or an unsubstituted or substituted divalent heterocyclic group, and a hydrogen atom in the alkyl group may be replaced by a fluorine atom), an unsubstituted or substituted aryl group, and an unsubstituted or 15 substituted heterocyclic group, with the proviso that at least one of R<sub>15</sub>, R<sub>16</sub>, R<sub>17</sub>, R<sub>18</sub>, R<sub>19</sub>, and R<sub>20</sub> is a partial structure comprising an indole ring represented by the general formula (1) and at least another of R<sub>15</sub>, R<sub>16</sub>, R<sub>17</sub>, R<sub>18</sub>, R<sub>19</sub>, and R<sub>20</sub> is a partial 20 structure comprising a carbazole ring represented by the general formula (2).

19. The organic compound according to claim 18, which is represented by the following general formula (5):



which corresponds to the general formula (4) in which X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub>, X<sub>5</sub>, and X<sub>6</sub> are all not nitrogen.

20. The organic compound according to claim 18  
 5 or 19, wherein at least three of R<sub>15</sub>, R<sub>16</sub>, R<sub>17</sub>, R<sub>18</sub>, R<sub>19</sub>, and R<sub>20</sub> are independently a partial structure  
 and represented by the general formula (1) or (2).

21. The organic light-emitting device according  
 to any one of claims 3 to 8, wherein the light-  
 10 emitting layer comprises a plurality of  
 phosphorescent materials.

22. The organic light-emitting device according  
 to any one of claims 1 to 14, which has the organic  
 layer sandwiched by opposing two electrodes and emits  
 15 light by application of a voltage between the  
 electrodes.

23. An image display comprising the organic  
 light-emitting device set forth in claim 22 and means  
 for supplying an electric signal to the organic  
 20 light-emitting device.